

REMARKS

Claims 1-8 were examined in the most recent, non-final office action dated August 25, 2006. All claims stand rejected as obvious over Nagatani, U.S. Patent Application No. 2005/0216211 in view of Belt, U.S. Patent No. 6,774,934. Applicants respectfully request withdrawal of the rejection and issuance of a Notice of Allowance based on the remarks presented herein.

Claim 1 recites a method of measuring a propagation time of a sound wave between a speaker and a microphone, including outputting a time stretched pulse from a speaker and calculating a cross-correlation function of a time stretched pulse and the received sound signal taken in the second step, wherein the propagation time of the sound wave between the speaker and the microphone is found based on the cross-correlation function. Claim 4 recites similar elements in a device claim.

Neither of the cited references discloses or suggests calculating a cross-correlation function of an outputted time stretched pulse (TSP) and a received sound signal, and neither discloses or suggests calculating a propagation time of a sound wave based on the cross-correlation function. In contrast, Nagatani discloses a system that adds reverberation effect to a digital audio signal. See paragraph 88. While Nagatani does disclose issuing a TSP, Nagatani's system only converts that TSP into an impulse signal, where "the measured result is converted into an impulse response corresponding to reverberation generated with the impulse signal." The office action asserts that Nagatani discloses some form of a "cross-collection function." This term is never used in Nagatani, nor is there any disclosure or suggestion in Nagatani that a cross-collection function is in any way related or similar to the cross-correlating function of claim 1. Accordingly, Nagatani fails to disclose cross-

correlating the outputted TSP and the received signal, and Nagatani further fails to disclose calculating a propagation time.

Belt likewise fails to disclose or suggest cross correlating an outputted TSP and a received signal, and further fails to disclose or suggest measuring the propagation time. Belt is directed to a signal source localization arrangement. For example, when a person speaks, the system can determine where the person is standing, and a video camera can automatically point at him or her. The system includes two microphones that each receive a signal from a single source such as a speaker. The system cross correlates the received signals to determine the delay between the receipt of the signals, and uses the time interval between the receipt of the signals to determine the location of the source of that signal.

Accordingly, while Belt discloses cross-correlating impulses from two received sound signals, Belt fails to disclose cross-correlating an outputted TSP and a received sound signal. Because neither reference discloses or suggests cross correlating an outputted signal with a received signal, the claims are allowable over the cited references.

Belt further fails to disclose a method or device that can determine a propagation time from an output speaker to a microphone, as claimed. Instead, Belt discloses determining the time delay between two received signals. The claims are also allowable because neither reference discloses determining a propagation time from an output speaker to a microphone

Finally, the use of a TSP in measuring a propagation time is an improvement over Belt in any respect, because Belt fails to disclose the use of a TSP at all. As stated in the specification, the TSP “is less susceptible to a noise because of its relatively large energy with respect to its amplitude. Therefore, a measurement value of the propagation time of the sound wave by the above method and device has high reliability.” Specification, page 5, first

full paragraph. Because Belt fails to disclose the use of a TSP, the calculations of Belt may be more susceptible to a noise. Again, Nagatani fails to disclose measuring a propagation time at all. Thus, none of the cited references disclose the use of a TSP in measuring a propagation time.

Accordingly, independent claims 1 and 4 are allowable over the art of record. Dependent claims 2, 3, and 5-8 are allowable for at least the same reasons.

CONCLUSION

In view of this response, Applicants submit the pending application is in condition for allowance. If, in the opinion of the Examiner, a telephone conference would expedite prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Applicants believe no fee is due with this response. However, if any fee is due, please charge our Deposit Account No. 13-2855, under Order No. 19036/41173, from which the undersigned is authorized to draw.

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Respectfully submitted,

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